

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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About 9:30 p.m., December 17, 1958

By T. Keith Glennan
Administrator, National Aeronautics and Space Administration,
Wright Day Dinner, Sheraton-Park Hotel, Washington, D. C.
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To this distinguished audience, it is appropriate to recall tonight the words spoken by Bernard Baruch just about a year ago. That very wise man of our age judged Sputnik to be -- and these are his words -- "more than a satellite hurling through space, more than a warning of leadership jeopardized and security imperiled. Sputnik represents a test of democracy." Mr. Baruch then asked...and again I quote: "Do we meet this challenge -- regain our leadership, assure our security? Do we discipline ourselves to protect our freedoms?"

It is with these questions that I want to deal tonight. It is easy -- all too easy and normal -- for us Americans to respond to such questions with a ringing -- "We must! We shall!"

But, actually, what has been done? How well has it been done? Are we operating on a broad front with a well-defined set of goals, with disciplined, well-organized attacks on the problems which must be solved as we move toward those goals?

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Last summer, I was privileged to be one of a small group of university presidents visiting the Soviet Union to study and attempt to understand the Russian system of higher education. Our investigation took us to Moscow, Leningrad, Tbilisi, and out into Middle Asia to the cities of Tashkent, Samarkand and Alma-Ata. There are many elements in the educational structure of the USSR that would be of interest to you, but I want only to report that my most vivid impression was that of the energy and purpose with which the students and the professors attacked their respective problems. Theirs is an entirely pragmatic operation...organized to serve the purposes of the State. It is a most effective system for the Soviet Union. It provides for the production of specialists in adequate numbers to furnish the necessary technical competence to accomplish whatever tasks the State may decide.

The purposes of our own nation would not be well served by such an educational system. We believe firmly that the individual should be encouraged to develop himself to the limit of his intellectual powers -- not for the purpose of fulfilling some arbitrary plan laid down by a dictatorial Government, but solely to the end that he may live a fuller and more responsible life -- a life of his own choosing -- in the kind of society we have established over the centuries. We believe that only in this way will we achieve maximum contribution by the individual to the determination of the nation's goals.

Having said that, this fact remains: The results achieved by the Russians in the fields of atomic energy, aircraft development, and now in space exploration, through the application of a rugged educational program have caused us to re-examine our own system. It has

become all too obvious that we need to raise our own standards of academic performance, not alone in the fields of science and technology, but in every field of learning and endeavor, -- and to expect and require more from our students. And it is reassuring to know that this process is well under way...that the climate of public opinion is enabling -- yes, even demanding -- the standards of academic quality be raised substantially throughout our educational system. This will be accomplished, I am sure, without recourse to the dictatorial methods of control used by the Soviet Union.

A crowning achievement of the USSR -- the launching of the Sputniks more than a year ago -- finally shocked our people into a state of real concern about our standing in the race for technological leadership in the world. Various people have characterized our reactions as hysterical, wasteful, disorganized, and ineffective. Much has been said, critically and bitterly, about our inability to place into orbit as heavy an object as did the Russians.

In the 14 months that have passed, much of the hysteria and the bitterness has subsided. But we have not gone back to sleep. As in the field of education, it is a hopeful sign that today, serious and penetrating questions are being raised about the space goals we seek to achieve and about the prompt development of sound but imaginative programs to reach those goals. And both within and without the government, matters continue to be debated relating to organizational arrangements to carry out the nation's space exploration program.

Let us look at some of these matters with a view to providing at least a partial answer to Mr. Baruch's questions quoted earlier this evening and repeated here -- "Do we meet this challenge -- regain our leadership, assure our security? Do we discipline ourselves to

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what progress has been made toward their fulfillment? The answer, of course, is that we have only started to appreciate the magnitude of the tasks facing us in this new field. Our first reaction to the launching of the Sputniks was a natural one -- let's get some payloads of our own into orbit. Every bit of the energy of our civilian and military scientific teams working in these fields was applied to this job. And everyone who has played a part in this effort can be proud -- rightfully proud -- of a first year space effort that unquestionably was good.

Without discussing at length our successes, failures and partial failures, it is a matter of record that we have sent four satellites into orbit and two probes farther into space than any man-made object has previously been propelled. And much useful and novel information has been returned to us for publication to the scientific community throughout the world as part of our contribution to the program of the International Geophysical Year.

In the past few months, however, it has become increasingly apparent that we need more clearly to define our national programs, both military and civilian, in the space field. It is quite true, as we have been quick to point out, that we have learned much from our failures -- in many cases more of real value to the future of our program than we have learned from our successes or partial successes. But I am reminded of an old saying in the medical profession which

goes -- "The operation was a success but the patient died." Surgeons can't operate for very long on that basis; nor can we in the space business. So where do we go from here?

It is clearly apparent that our ability to progress is dependent on the reliability of available rocket boosters and the control and guidance systems that can be developed to meet the increasingly difficult tasks we are setting for ourselves. Fortunately, these rocket motors are becoming more reliable and they must continue to do so. Earlier this week we took the initial steps looking toward the development of a family of boosters that should satisfy the nation's requirements for the next five years. This matter will be pursued

vigorously with the close collaboration of both the military services and industry.

Today, as some of you know, we announced that the Rocketdyne Division of North American Aviation had been selected for the task of designing and building a rocket engine in the million to million and one half pound thrust class. Possession of this engine, some four years from now, very obviously will increase our ability to send very large payloads into space. But I think we have altogether too much to do, right now, for us to spend much time speculating upon the wonders of what we will be able to do once this new giant power plant has been brought to a state of usefulness.

Among other immediate tasks is the improvement of our tracking and communications capabilities. Data-gathering will be, for some time to come, the essential mission of our space vehicles. This involves both the ground-based acquisition radars and telemetry stations and the very highly specialized instrumentation to be carried aloft for the purpose of sensing physical phenomena and recording the results for immediate or delayed transmission to the ground stations. In this general area we can expect, indeed we do expect, to develop cooperative programs with other nations under the provisions of the Space Act governing such cooperation.

As to the immediate future, during calendar 1959, the United States will be sending into space a considerable number of satellites and probes under ARPA and NASA direction. The scientists were satisfied -- in fact they were delighted -- with the qualitative information that was sent back in 1958 from the U.S. space vehicles. But now they want more precise, quantitative data, and this is the kind of information that we must provide, in large amounts.

Our modern-day Mercury will be selected with the greatest of care. We will use the entire resources of the nation to determine, in advance insofar as possible, man's ability to cope with the physical, mental and psychological stresses of space travel. We hope to accomplish this determination on the ground ... in the nation's aero-medical laboratories. All this must be done before any attempts are made to send Mercury aloft.

The problems that must be solved in connection with this project ...the ones we know about now...are very difficult. We anticipate we shall be facing other problems, not yet identified, that also will require solution.

- 10 -

There will be little glamor attached to most of these continuing efforts. They will be the doing, again and again, of space tasks which may appear to be much the same. But it is only through this seemingly repetitive kind of operation -- developing the necessary sums of detailed information in terms of time and distance -- that the real pay-offs will be assured. Until this is done, operational space systems for military or civilian purposes will be less than satisfactory and run the chance of being excessively costly.

This is an undertaking that demands the very best effort from all of us. All that is required, and now I quote an observation about us, the American people, by the British historian, Edward Crankshaw: "All that is required is for the strongest people in the world to look into their hearts for the true source of their potential greatness and their uniqueness and to build on what they find."

Bernard Baruch asked: "Do we meet this challenge ... do we discipline ourselves to protect our freedoms?"

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It is with these questions that I want to deal tonight. It is easy -- all too easy and normal -- for us Americans to respond to such questions with a ringing - "We must! We shall!"

But, actually, what has been done? How well has it been done? Are we operating on a broad front with a well-defined set of goals, with disciplined, well-organized attacks on the problems which must be solved as we move toward those goals?

As a relative newcomer, perhaps I may be permitted a few observations -- hopefully stated in a constructive manner. What I shall say is with the realization that, in any discussion that attempts to clarify the issues involved in getting on with the job, it is absolutely necessary to remember that the pace at which we must move

is not wholly under our control. The competitive nature of today's world actually dictates our pace.

Last summer, I was privileged to be one of a small group of university presidents visiting the Soviet Union to study and attempt to understand the Russian system of higher education. Our investigation took us to Moscow, Leningrad, Tbilisi, and out into Middle Asia to the cities of Tashkent, Samarkand and Alma-Ata. ^RThese are many elements in the educational structure of the USSR that would be of interest to you, but I want only to report that my most vivid impression was that of the energy and purpose with which the students and the professors attacked their respective problems. There is an entirely pragmatic operation ... organized to serve the purposes of the State. It is a most effective system for the Soviet Union. It provides for the production of specialists in adequate numbers to furnish the necessary technical competence to accomplish whatever tasks the State may decide.

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^{A DICTATORIAL} Government, but solely to the end that he may live a fuller and more responsible life -- a life of his own choosing -- in the kind of society we have established over the centuries.

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Having said that, this fact remains: The results achieved by the Russians in the fields of atomic energy, aircraft development,

and now in space exploration, through the application of a rugged educational program have caused us to re-examine our own system.

It has become all too obvious that we need to raise our own standards, ^{NOT ALONE IN THE FIELDS OF SCIENCE AND TECHNOLOGY, BUT IN EVERY FIELD OF LEARNING} of academic performance, -- ^{AND} to expect and require more from our ^{AND ENDEAVOR} students. And it is reassuring to know that this process is well under way ... that the climate of public opinion is enabling -- yes, even demanding -- the standards of academic quality be raised substantially throughout our educational system. This will be accomplished, I am sure, without recourse to the dictatorial methods of control used by the Soviet Union.

A crowning achievement of the USSR -- the launching of the Sputniks more than a year ago -- finally shocked our people into a state of real concern about our standing in the race for technological leadership in the world. Various people have characterized our reactions as hysterical, wasteful, disorganized, and ineffective. Much has been said, critically and bitterly, about our inability to place into orbit as heavy an object as did the Russians.

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Let us look at some of these matters with a view to providing at least a partial answer to Mr. Baruch's questions quoted earlier this evening and repeated here -- "Do we meet this challenge -- regain our leadership, assure our security? Do we discipline ourselves to protect our freedoms?"

In thinking about our goals in this field of space exploration, I came across^S a statement made recently on his return from a visit to Russia by Dr. Gerard P. Kuiper, director of the Yerkes Observatory of the University of Chicago. He suggested a reason for Soviet efforts in the space field that intrigues me very much when he said, "The skies and the heavens above have been considered traditionally as the work of God. Thus penetrating the heavens and putting a star between the stars is almost a God-like act. The Russians have understood this very well and have announced that they have placed among the stars the first new object since the God of the Old Testament. Now, we may not like such terms, but that is the way the Russians present them. The impact of Russian propaganda has been enormous, in Russia and the rest of the world."

Certainly, we must not overlook this fact -- that Russia has exploited its admittedly important space pioneering so as to achieve maximum prestige gains. But, having conceded this point, I don't think it follows, we should let ourselves be panicked into spending millions upon millions in almost any sort of frantic attempt to avoid being "beaten" in assumed space races with the Russians.

The Russians know what they're doing. They know where they want us to go. Let us be equally sure we know what we want to do. And then let us do it.

As to our own goals, it seems to me that they are stated simply and effectively in the National Aeronautics and Space Act of 1958. Declaring that "it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind," the Congress then stated that the aeronautical and space activities of the United States should contribute materially to one or more of several objectives which I will paraphrase for purposes of brevity as:

1. The expansion of human knowledge of phenomena in the atmosphere ^{AND IN} space.

2. The improvement of the usefulness, performance, speed, safety and efficiency of aeronautical and space vehicles.

3. The development and operation of space vehicles for a variety of purposes.

4. The study of potential benefits to be gained for mankind through space activities.

5. The preservation of the role of the United States as a leader in aeronautical and space activities for peaceful purposes.

6. The interchange of information between the civilian and military agencies to the end that maximum effectiveness of discoveries be had for defense as well as for peaceful purposes.

7. The cooperation ~~which~~ ^{with} other nations in the performance

of research done under the Act and in the peaceful application of the results of such research. And,

3. The most effective utilization of scientific and engineering resources of the United States in achieving these goals.

In this same section of the Act, provision is made for the Department of Defense to concern itself with activities in space which are peculiar to or primarily associated with the defense of the nation, including pertinent research and development activities.

Until the threats to the security of this nation and the rest of the world are substantially reduced or eliminated entirely, it seems quite clear that our national goals must include the acquisition of new knowledge which will satisfy both defense requirements and our great determination to use this knowledge for the benefit of all mankind -- not for his enslavement or his destruction.

I suppose it is only fair to say that these goals have been crystallized for a period of less than six months. But we can ask-- what progress has been made toward their fulfillment? The answer, of course, is that we have only started to appreciate the magnitude of the tasks facing us in this new field. Our first reaction to the launching of the Sputniks was a natural one -- let's get some payloads of our own into orbit. Every bit of the energy of our civilian and military scientific teams working in these fields was applied to this job. And everyone who has played a part in this effort can be proud -- rightfully proud -- of a first year space

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There is need to lay out a long range program calling for the acquisition of basic scientific information and the development of the technology necessary to this mission. Such a program would include an orderly attack on a broad front including astronomical, geophysical, meteorological and similar basic areas of knowledge. Those among you who are scientists can add to this list a variety

of useful suggestions arising from your professional interests. The important matter here is that orderly programs in these basic areas be planned, scheduled and undertaken. Studies are well underway to achieve exactly this result with the active collaboration of the Space Science Board of the National Academy of Sciences, members of the military services and of the staff of the Advanced Research Projects Agency of the Department of Defense and of our own NASA laboratories as well as individual scientists both here and abroad. Our agency -NASA- has been charged by the President with the responsibility for initiating and carrying out this task with the assistance of the Department of Defense.

It is clearly apparent that our ability to progress is dependent on the reliability of available rocket boosters and the control and guidance systems that can be developed to meet the increasingly difficult tasks we are setting for ourselves. Fortunately, these rocket motors are becoming more reliable and they must continue to do so. Earlier this week we took the initial steps looking toward the development of a family of boosters that should satisfy the nation's requirements for the next five years. This matter will be pursued vigorously with the close collaboration of both the military services and industry.

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Among other immediate tasks is the improvement of our tracking and communications capabilities. Data-gathering will be, for some time to come, the essential mission of our space vehicles. This involves both the ground-based acquisition radars and telemetry stations and the very highly specialized instrumentation to be carried aloft for the purpose of sensing physical phenomena and recording the results for immediate or delayed transmission to the ground stations. In this general area we can expect, indeed we do expect, to develop cooperative programs with other nations under the provisions of the Space Act governing such cooperation.

Despite initial accomplishments, we are very much in the beginning stages of space exploration. We are finding that, as is the case in any field of scientific exploration, there is little that is exclusively military or exclusively civilian. In such situations, the national interest is well served if agencies both military and civilian perform effective work, provided that there is no significant amount of unnecessary duplication.

Time tonight does not permit a detailed account of the manner in which the military and civilian space activities are being forged

into a cohesive national program. I do say, however, that such is the case, and I say this despite the creakings and groanings that are heard from time to time as this process continues. One of our priceless heritages from the National Advisory Committee for Aeronautics was a 43-year record of the most effective and intimate working relationships with the military services. We in NASA are determined to maintain equally effective working relationships with industry and with the military services.

Here, I might add that the mission of the splendid research centers that our agency inherited from NACA is being continued unchanged, to perform the underlying research requisite to continued improvement in all realms of flight. Specific research programs will be ^{ALTERED,} ~~changed,~~ but the goals will remain the same. Information coming from such programs is applicable equally to military and civilian flight missions in and beyond the atmosphere.

Similarly, much of the good work of the Jet Propulsion Laboratory at Pasadena, California, which the President transferred to NASA earlier this month and which the California Institute of Technology will continue to operate under contract ^{FOR} ~~to~~ NASA, will provide information of value not only to the civilian space activities of NASA but to the space work of the military services as well.

As to the immediate future, during ~~the~~ calendar 1959, the United States will be sending into space a considerable number of satellites and probes under ARPA and NASA direction. The scientists were satisfied -- in fact they were delighted -- with the qualitative

information that was sent back in 1958 from the U.S. space vehicles. But now they want more precise, quantitative data, and this is the kind of information that we must provide, in large amounts.

There will be little glamor attached to most of these continuing efforts. They will be the doing, again and again, of space tasks which may appear to be much the same. But it is only through this seemingly repetitive kind of operation -- developing the necessary sums of detailed information in terms of time and distance -- that the real pay-offs will be assured. Until this is done, operational space systems for military or civilian purposes will be less than satisfactory and run the chance of being excessively costly.

Looking to the future, NASA is directing the national effort that has as its objective the putting into space of man himself. ARPA is participating in this program. We call this effort Project Mercury. I believe this is the first time we've ever mentioned the project publicly.

Our modern-day Mercury will be selected with the greatest of care. ^{IF AT ALL POSSIBLE,} ~~He must also be~~ he will be technically trained. He should have a good working knowledge of medicine, psychology, aerodynamics, and space technology. He ~~must also be~~ a trained observer. It is not essential that he be a trained airplane pilot, because we will teach him how to maneuver and how to "fly" his space vehicle. ^{WILL USE} We ~~shall be using~~ the entire resources of the nation to determine,

in advance insofar as possible, man's ability to cope with the physical, mental and psychological stresses of space travel. We hope to accomplish this determination on the ground ... in the nations's aero-medical laboratories. All this must be done before any attempts are made to send Mercury aloft. *... conviction in with project ...*

The problems that must be solved *all* the ones we know about now ... are very difficult. We anticipate we shall be facing other problems, not yet identified, that also will require solution.

To sum up, I believe, with the utmost conviction, that we have a national...yes, an international...responsibility to lead in the exploration of space. If all the possible benefits from space ^{TO BE} are made available fully, around the world, to all mankind, then it is absolutely essential that we show the way.

This is an undertaking that demands the very best effort from all of us.

~~Am I discouraged? Do I expect that we may fail? I wouldn't have taken this job if I had had doubts about what we can and must do.~~

All that is required, and now I quote an observation about us, the American people, by the British historian, Edward Crankshaw:

"All that is required is for the strongest people in the world to look into their hearts for the true source of their potential greatness and their uniqueness and to build on what they find."

Bernard Baruch asked: "Do we meet this challenge...do we discipline ourselves to protect our freedoms?"

The nation's answer to that question is still in the process of formulation.

My answer is that we must meet the challenge with well ^{PLANNED} disciplined efforts and with ^{THAT} a sense of urgency ^{WHICH} ~~that~~ will not be denied.

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